MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2017/2018

DBM5018 – BUSINESS MATHEMATICS

(RS)

1 JUNE 2018

3.00 pm – 5.00 pm

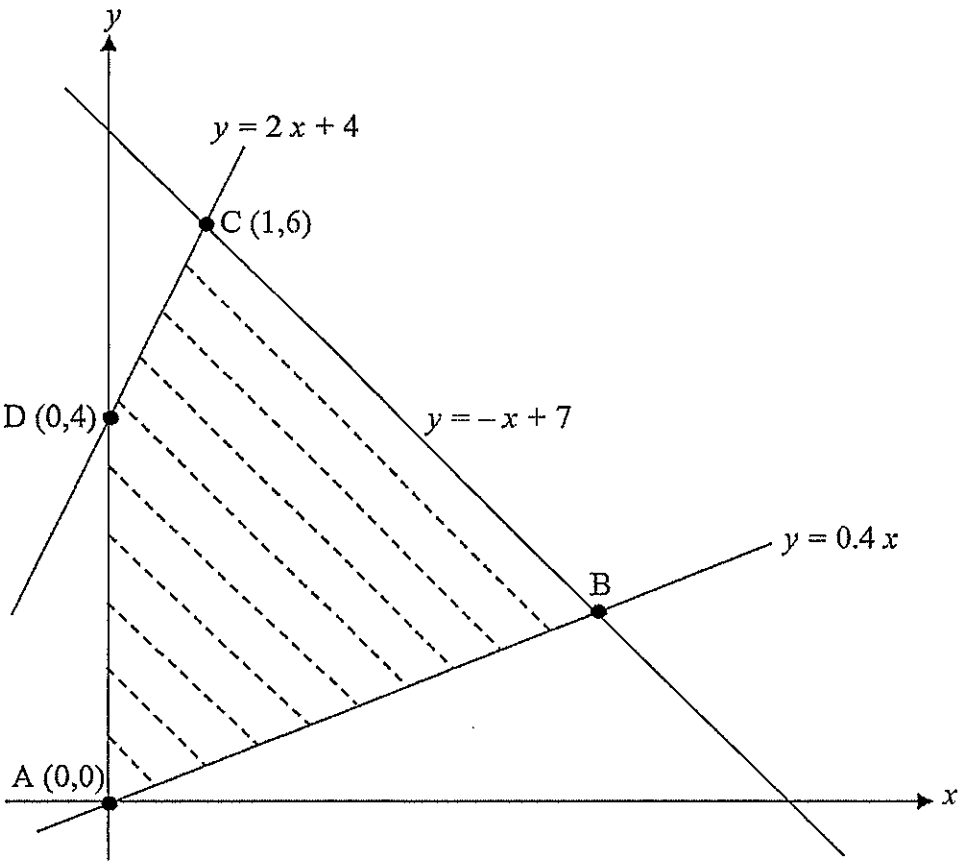
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **3** pages excluding cover page and appendix.
2. Attempt **ALL FOUR (4)** questions. The distribution of marks for each question is given.
3. Write all your answers in the Answer Booklet provided.
4. Key formulae are given in the Appendix.

Question 1

a) A recent theatre of Putera Gunung Ledang is opened for staff and student in MMU Melaka. The ticket price has been set to RM250 and RM200 respectively. Let x be the number of staff and y be the number of student. The graph below shows the constraints for the theatre audience.



i. State the objective function, $P = Ax + By$. (1 mark)

ii. List the linear inequalities obtained from the graph. (4 marks)

iii. From the graph, determine the coordinate of point B. (4 marks)

iv. Calculate the ticket price for each of the corner point A, B, C and D. Hence, justify the number of staff and student in order to maximize the ticket price. (6 marks)

b) Callice Florist provides 2 delivery teams of bouquet in Melaka. The delivery team X and Y make at least a total of 450 sets of roses, 300 sets of lavender and 260 sets of daisy. The following table shows the constraints for each team.

	Team X	Team Y
Roses	15	5
Lavender	5	10
Daisy	8	8

i. Identify the linear inequalities that satisfy the above constraints. (4 marks)

ii. Hence, determine the x and y intercepts for each condition. (6 marks)

[TOTAL 25 MARKS]

Continued...

Question 2

a) Mikael saves his money in Bank P and Bank Q. Bank P pays 4.27% per annum compounded monthly and Bank Q pays 4.30% per annum compounded quarterly.

i. Find the effective rate of each bank. (4 marks)

ii. Identify which bank offers a better return to him. (1 mark)

b) Mr Bawand plans to buy a house that cost RM570,000. He is required to pay a 10% deposit of the selling price. For the remaining amount, he is eligible to take a CIMB bank loan which the simple interest rate is charged at 2.7% per year.

i. Calculate the amount of the deposit. (1 mark)

ii. Identify the amount of bank loan. (1 mark)

iii. Compute the interest charged by CIMB bank for 10 years. (2 marks)

iv. How much Bawand needs to pay CIMB bank in total? (1 mark)

v. Find the monthly instalment if Bawand needs to pay back in 10 years. (2 marks)

c) Haddiff is planning for his daughter's education saving. How much should he invest now if he wishes to have RM70,000 at the end of 15 years at an annual interest rate of 5% compounded quarterly? (4 marks)

d) Padayappa saves RM10,000 in a fund that pays interest at an annual rate of 8.5% compounded half-yearly. Find the amount he can withdraw every 6 months so that the balance in the account will be zero at the end of 10 years. (5 marks)

e) Compute the future value annuity of RM200 per month for 7 years with interest paid monthly at the annual rate of 1.5% compounded monthly. (4 marks)

[TOTAL 25 MARKS]

Question 3

a) Find the derivatives of

i. $f(x) = 8\ln x + 1.73x - 9e^x$. (3 marks)

ii. $f(x) = \frac{1}{x} + x^2 - 2018$. (3 marks)

b) Differentiate $g(x) = (2x-5)(3+3x^3)$ by using **Product Rule**. (5 marks)

c) Given $y = 7(x^2+3)^{-2}$.

i. Use the **Chain Rule** to find $\frac{dy}{dx}$. [Hint: Let $u = x^2 + 3$] (6 marks)

ii. Hence, from answer in part (i), evaluate $\frac{dy}{dx}$ when $x = 1$. (2 marks)

d) Given that the cost function of a product is $C(q) = 2027q^3 - 207q^2 + 27q - 7$ where q is the quantity unit produced.

i. Find the marginal cost function, $C'(q)$. (4 marks)

ii. What is the marginal cost (in RM) if there is a 10 units of produced quantity? (2 marks)

[TOTAL 25 MARKS]

Continued...

Question 4

a) Find the following indefinite integral $\int\left(4x^7-3+3x^{-1}+3e^x-\frac{3}{x^7}\right)dx$. (5 marks)

b) Evaluate $\int_1^3\left(2x^3-x^2+4x-1\right)dx$. (7 marks)

c) Given $\int(3x-2)^7\,dx$.

i. If $u=3x-2$, find $\frac{du}{dx}$. (1 mark)

ii. From part (i), solve $\int(3x-2)^7\,dx$ by using the **Substitution Rule.** (4 marks)

d) The marginal-revenue function of a Gen Company is $R'(q)=\frac{900q^2}{\sqrt{36}}+126q$ where q is the quantity unit produced.

i. Identify the total-revenue function, $R(q)$. (4 marks)

ii. Hence, calculate the sales revenue from 10 to 20 units. (4 marks)

[TOTAL 25 MARKS]

End of Page.

APPENDIX – FORMULAE

Inequality	Solution
$\|x\| < a$	$-a < x < a$
$\|x\| \le a$	$-a \le x \le a$
$\|x\| > a$	$x < -a$ or $x > a$
$\|x\| \ge a$	$x \le -a$ or $x \ge a$

Effective Rate

$$r_e = \left(1 + \frac{r}{n}\right)^n - 1$$

Simple Interest	Future Value
$I = Prn$	$FV = PV(1+r)^n$
Present Value Annuity	**Future Value Annuity**
$A = R\left[\frac{1-(1+r)^{-n}}{r}\right]$	$S = R\left[\frac{(1+r)^n - 1}{r}\right]$

Derivatives

1. $\frac{d}{dx}(ax^n) = anx^{n-1}$	2. $\frac{d}{dx}[g(x)]^n = n[g(x)]^{n-1} \cdot g'(x)$
3. $\frac{d}{dx}[f(x)g(x)] = f(x)g'(x) + g(x)f'(x)$	4. $\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] = \frac{g(x)f'(x) - f(x)g'(x)}{[g(x)]^2}$

Logarithmic Functions	Exponential Functions	Chain Rule
$\frac{d}{dx}(\ln x) = \frac{1}{x}$	$\frac{d}{dx}(e^x) = e^x$	$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$
$\frac{d}{dx}\ln u = \frac{1}{u} \cdot \frac{du}{dx}$	$\frac{d}{dx}e^u = e^u \frac{du}{dx}$	

Integration

1. $\int k\,dx = kx + C$	2. $\int x^n\,dx = \frac{x^{n+1}}{n+1} + C, \quad n \ne -1$
3. $\int e^x\,dx = e^x + C$	4. $\int \frac{1}{x}\,dx = \ln x + C$
Definite Integral, $A = \int_a^b f(x)\,dx = F(b) - F(a)$	